United Nations

Framework Convention on Climate Change

FCCC/IDR.6/DEU

Distr.: General
17 February 2015

English only

Report of the technical review of the sixth national communication of Germany

Parties included in Annex I to the Convention are requested, in accordance with decision 9/CP.16, to submit a sixth national communication to the secretariat by 1 January 2014. In accordance with decision 7/CMP.8, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol shall include in their sixth national communication supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. In accordance with decision 15/CMP.1, these Parties shall start reporting the information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention for the first year of the commitment period. This includes supplementary information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

This report presents the results of the technical review of the sixth national communication and supplementary information under the Kyoto Protocol of Germany conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" and the "Guidelines for review under Article 8 of the Kyoto Protocol".

GE.15-02744 (E)

1502744

Please recycle

Contents

		Paragraphs	*Page*
I.	Introduction and summary	1–12	3
	A. Introduction	1–7	3
	B. Summary	8–12	4
II.	Technical review of the reported information in the national communication and supplementary information under the Kyoto Protocol	13–139	6
	A. Information on greenhouse gas emissions and national circumstances relevant to greenhouse gas emissions and removals, including other elements related to the Kyoto Protocol	13–29	6
	B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol	30–92	10
	C. Projections and the total effect of policies and measures, including information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol	93–111	19
	D. Provision of financial resources and technology transfer to developing country Parties, including information under Articles 10 and 11 of the Kyoto Protocol	112–124	25
	E. Vulnerability assessment, climate change impacts and adaptation measures	125–128	28
	F. Research and systematic observation	129–133	30
	G. Education, training and public awareness	134–139	31
III.	Summary of reviewed supplementary information under the Kyoto Protocol	140–145	32
	A. Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol	140–141	32
	B. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol	142–145	33
IV.	Conclusions and recommendations	146–162	33
V.	Questions of implementation	163	36
Annex			
	Documents and information used during the review		37

I. Introduction and summary

A. Introduction

1. For Germany the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Under the Convention, Germany, as part of the European Union (EU), has taken on a quantified economy-wide emission reduction target jointly with all EU member States to reduce its greenhouse gas (GHG) emissions by 2020. The EU and its member States have communicated an unconditional quantified economy-wide emission reduction target of a 20.0 per cent emission reduction by 2020 compared with 1990 levels.[1]

2. Within the burden-sharing agreement of the EU for meeting commitments under the Kyoto Protocol, Germany committed itself to reducing its GHG emissions by 21.0 per cent compared with the base year[2] level during the first commitment period, from 2008 to 2012. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, Germany committed to contribute to the joint EU efforts to reduce GHG emissions by 20.0 per cent below the base year. Under the EU 2020 climate and energy package, this target will be met by the EU and its member States through a 21.0 per cent reduction, compared with 2005 levels, in GHG emissions from installations under the European Union Emissions Trading System (EU ETS) and a 10.0 per cent reduction, compared with 2005 levels, in GHG emissions in the non-ETS sectors. According to the EU effort-sharing decision (ESD), Germany is to reduce its GHG emissions from the non-ETS sectors by 14.0 per cent by 2020 compared with the 2005 level.

3. In addition, Germany has set an ambitious domestic economy-wide emission reduction target of 40.0 per cent by 2020 compared with 1990.

4. This report covers the in-country technical review of the sixth national communication (NC6) of Germany, coordinated by the secretariat, in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" (decision 23/CP.19) and the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1).

5. The review took place from 6 to 11 March 2014 in Berlin, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Pierre Brender (France), Mr. Leonidas Osvaldo Girardin (Argentina), Ms. Stephanie Ockenden (United Kingdom of Great Britain and Northern Ireland), Mr. Brian Mantlana (South Africa) and Mr. Simon Wear (New Zealand). Mr. Mantlana and Mr. Wear were the lead reviewers. The review was coordinated by Ms. Barbara Muik (secretariat).

6. During the review, the expert review team (ERT) reviewed each section of the NC6. The ERT also reviewed the supplementary information provided by Germany as a part of the NC6 in accordance with Article 7, paragraph 2, of the Kyoto Protocol. In addition, the ERT reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which was provided by Germany in its 2014

[1] FCCC/SB/2011/INF.1/Rev.1 and FCCC/AWGLCA/2012/MISC.1 and Add.1 and 2.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride. The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

annual submission and previous submissions and elaborated further in its 2014 annual submission under Article 7, paragraph 1, of the Kyoto Protocol.

7. In accordance with decisions 23/CP.19 and 22/CMP.1, a draft version of this report was communicated to the Government of Germany, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Summary

8. The ERT conducted a technical review of the information reported in the NC6 of Germany in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines on NCs). As required by decision 15/CMP.1, supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol[3] is provided in the NC6 (see para. 140 below). The supplementary information on the minimization of adverse impacts referred to in paragraph 6 above is complete and transparent.

9. Germany implemented part of the recommendations provided in the report of the in-depth review of the fifth national communication (NC5) of Germany.[4] The ERT commends Germany for its improved reporting. However, Germany did not follow the recommendations to include, completely and transparently: information on the total effect of policies and measures; a presentation of the projections, aggregated and by gas; information on decision-making procedures and the involvement of different governance levels; a description of the enforcement procedures Germany has in place to meet its Kyoto Protocol commitments; and an explanation on how Germany reports its success and failure stories in the transfer of technology. During the review, Germany provided further relevant information.

1. Completeness and transparency of reporting

10. Gaps and issues related to the reported information identified by the ERT are presented in table 1 below.

2. Timeliness

11. The NC6 was submitted on 20 December 2013, before the deadline of 1 January 2014 mandated by decision 9/CP.16. A revised submission was submitted on 17 September 2014. The revised version contained primarily changes to formatting for professional publication. On 23 October 2014 a revised version was submitted with corrections and some missing elements identified during the review (see paras. 38 and 108 below).

3. Adherence to the reporting guidelines

12. The information reported by Germany in its NC6 is mostly in adherence with the UNFCCC reporting guidelines on NCs as per decision 4/CP.5 (see table 1).

[3] Decision 15/CMP.1, annex, chapter II.
[4] FCCC/IDR.5/DEU.

Table 1
Assessment of completeness and transparency issues of reported information in the sixth national communication of Germany[a]

Sections of national communication	*Completeness*	*Transparency*	*Reference to paragraphs*	*Supplementary information under the Kyoto Protocol*	*Completeness*	*Transparency*	*Reference to paragraphs*
Executive summary	Complete	Transparent		National systems	Complete	Transparent	
National circumstances	Complete	Transparent		National registries	Complete	Transparent	
Greenhouse gas inventory	Complete	Transparent		Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Mostly transparent	111
			78	PaMs in accordance with Article 2	Complete	Transparent	
Policies and measures (PaMs)	Complete	Mostly transparent	96, 109	Domestic and regional programmes and/or arrangements and procedures	Mostly complete	Partially transparent	23–25
Projections and total effect of PaMs	Mostly complete	Mostly transparent		Information under Article 10	Complete	Mostly transparent	123
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent	113, 123	Financial resources	Complete	Transparent	
Financial resources and transfer of technology	Mostly complete	Mostly transparent		Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	
Research and systematic observation	Complete	Transparent					
Education, training and public awareness	Complete	Transparent					

[a] A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in the chapter on conclusions and recommendations.

II. Technical review of the reported information in the national communication and supplementary information under the Kyoto Protocol

A. Information on greenhouse gas emissions and national circumstances relevant to greenhouse gas emissions and removals, including other elements related to the Kyoto Protocol

1. Information on relevant national circumstances

13. In its NC6, Germany has provided a detailed description of the national circumstances and elaborated on the framework legislation and key policy documents on climate change. Further information on the review of the institutional and legislative arrangements for the coordination and implementation of policies and measures (PaMs) is provided in chapter II.B below.

14. The ERT notes that Germany has considered the encouragements provided during the previous review and has addressed these issues in a comprehensive manner. With a view to quantifying changes in sequestrations in the forest sector, the ERT encourages Germany to include the results of the third federal forest inventory in its next national communication (NC).

15. The ERT noted that during the period 1990–2012, Germany's GHG emissions per gross domestic product (GDP) and GHG emissions per capita decreased by 45.7 and 27.1 per cent, respectively. While the collapse of the East German economy in the early 1990s did initially contribute to this decline, and the global financial crisis led to a fall in emissions in 2009, total GHG emissions have decreased at a steady and significant rate by 24.8 per cent between 1990 and 2012. Given that GDP grew by 38.7 per cent over the same period, these trends show a decoupling of GHG emissions and GDP due to technological improvements, behavioural changes, economic shifts and a fuel switch, some of these induced by PaMs. Table 2 illustrates the national circumstances of Germany by providing some indicators relevant to GHG emissions and removals.

Table 2
Indicators relevant to greenhouse gas emissions and removals for Germany

	1990	*2000*	*2005*	*2010*	*2012*	*Change 1990–2012 (%)*	*Change 2011–2012 (%)*
Population (million)	79.36	82.19	82.46	81.76	81.92	3.2	0.2
GDP (2005 USD billion using PPP)	2 055.81	2 490.81	2 566.00	2 740.49	2 851.34	38.7	0.7
TPES (Mtoe)	351.09	336.40	336.83	327.46	312.53	–11.0	0.5
GHG emissions without LULUCF (Mt CO_2 eq)	1 248.05	1 040.37	994.46	946.39	939.08	–24.8	1.1
GHG emissions with LULUCF (Mt CO_2 eq)	1 223.53	1 016.40	1 003.58	941.69	935.60	–23.5	1.2
GDP per capita (2005 USD thousand using PPP)	25.90	30.31	31.12	33.52	34.81	34.4	0.5
TPES per capita (toe)	4.42	4.09	4.08	4.01	3.82	–13.8	0.3
GHG emissions per capita (t CO_2 eq)	15.73	12.66	12.06	11.58	11.46	–27.1	0.9
GHG emissions per GDP unit (kg CO_2 eq per 2005 USD using PPP)	0.61	0.42	0.39	0.35	0.33	–45.7	0.4

Sources: (1) GHG emissions data: Germany's 2014 GHG inventory submission, version 1.1; (2) population, GDP and TPES data: International Energy Agency.

Note: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

Abbreviations: GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

2. Information on the greenhouse gas inventory, emissions and trends

16. Germany has provided a summary of information on GHG emission trends for the period 1990–2011. This information is fully consistent with the 2013 national GHG inventory submission. Summary tables, including trend tables for emissions in carbon dioxide equivalent (CO_2 eq) given in the common reporting format tables, are provided in the biennial report (BR), which has been presented by Germany as an annex to the NC6. During the review, the ERT took note of the 2014 annual submission. The relevant information therein is reflected in this report and presented in the following paragraphs.

17. Total GHG emissions[5] excluding emissions and removals from land use, land-use change and forestry (LULUCF) decreased by 24.8 per cent between 1990 and 2012, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 23.5 per cent over the same period. Excluding LULUCF, methane (CH_4) emissions decreased by 55.2 per cent and nitrous oxide (N_2O) by 34.6 per cent, while carbon dioxide (CO_2) emissions decreased between 1990 and 2012 by 21.2 per cent. Taken together and expressed in CO_2 eq, the emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) have increased by 8 per cent over the same time period. An analysis of the drivers of GHG emission trends by sector is provided in chapter II.B below. Table 3 provides an overview of GHG emissions by sector from 1990 to 2012.

18. During the review, Germany provided additional information, including preliminary inventory data for the year 2013 (emissions increased by 1.2 per cent compared with 2012) in a fully transparent manner.

Table 3
Greenhouse gas emissions by sector in Germany, 1990–2012

	GHG emissions (kt CO_2 eq)				*Change (%)*		*Share[a] by sector (%)*	
Sector	*1990*	*2000*	*2010*	*2012*	*1990–2012*	*2011–2012*	*1990*	*20*
1. Energy	1 019 026.26	856 419.15	792 256.11	786 030.46	–22.9	1.7	81.6	8
A1. Energy industries	426 946.36	359 634.83	356 707.25	364 755.82	–14.6	2.9	34.2	3
A2. Manufacturing industries and construction	177 184.21	118 651.83	116 165.34	115 121.83	–35.0	–2.1	14.2	1
A3. Transport	164 727.07	183 042.49	154 962.84	155 486.40	–5.6	–1.0	13.2	1
A4.–A5. Other	220 183.30	173 603.59	154 233.28	140 036.54	–36.4	4.6	17.6	1
B. Fugitive emissions	29 985.32	21 486.41	10 187.41	10 629.87	–64.5	5.9	2.4	

[5] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

Sector	GHG emissions (kt CO_2 eq)				Change (%)		Share[a] by sector (%)	
	1990	2000	2010	2012	1990 2012	2011 2012	1990	2012
2. Industrial processes	94 159.08	77 211.03	68 529.94	68 253.85	–27.5	–1.5	7.5	7.3
3. Solvent and other product use	4 538.56	2 971.21	1 911.18	1 756.08	–61.3	–4.2	0.4	0.2
4. Agriculture	87 821.21	75 903.03	68 367.71	69 490.36	–20.9	–1.2	7.0	7.4
5. LULUCF	–24 518.08	–23 967.82	–4 693.92	–3 487.84	–85.8	–14.7	NA	NA
6. Waste	42 503.64	27 862.91	15 323.33	13 552.56	–68.1	–5.8	3.4	1.4
GHG total with LULUCF	**1 223 530.68**	**1 016 399.51**	**941 694.36**	**935 595.47**	**–23.5**	**1.2**	**NA**	**NA**
GHG total without LULUCF	**1 248 048.77**	**1 040 367.33**	**946 388.27**	**939 083.31**	**–24.8**	**1.1**	**100.0**	**100.0**

Source: Germany's 2014 GHG inventory submission, version 1.1 (for GHG emission data).

Note: The changes in emissions and the shares by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA= not applicable.

[a] The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions that was offset by GHG removals through LULUCF.

3. National system

19. Germany provided in its NC6 a description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). The description includes all the elements mandated by decision 15/CMP.1. The NC6 also contains a reference to the description of a national system provided in the national inventory report of the 2013 annual submission. The ERT took note of the review of the changes to the national system as reflected in the report of the individual review of the GHG inventory of Germany submitted in 2013.

4. National registry

20. In its NC6, Germany has provided information on the national registry in accordance with the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1. The ERT took note of the review of the changes to the national registry as reflected in the report of the individual review of the GHG inventory of Germany submitted in 2013.

21. Germany described the changes as being specifically due to the consolidation of the EU ETS operations into a single EU registry operated by the European Commission and called the Consolidated System of European Union Registries (CSEUR). The CSEUR is a consolidated platform which implements the national registries in a consolidated manner and was developed together with the new EU registry.

5. Domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol

22. Germany has reported in its NC6 mostly comprehensive information on domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol.

23. Germany reported on most of the elements under this requirement. However, Germany has not reported on how information on legislative arrangements and enforcement and administrative procedures (e.g. rules on enforcement and administrative procedures and/or action taken) are made publicly accessible.

24. In addition, the ERT noted that the domestic and regional legislative arrangements and enforcement and administrative procedures Germany has in place to meet its commitments under the Kyoto Protocol, including the legal authority for such programmes, the way in which they are implemented, and procedures for addressing cases of non-compliance under domestic law were not provided except for a limited number of specific examples. For example, an independent system of random checks of energy performance certificates was cited. However, there was no information on the implementing agency nor who enforces the system and the consequences of non-compliance.

25. During the review, Germany explained that the building energy performance certificates are enforced at the local government level and that the fines were considered sufficiently large to deter non-compliance. The ERT considers that additional information in the NC would enhance reporting and recommends that Germany provide a description of its domestic and regional legislative arrangements and enforcement and administrative procedures and of how Germany makes this information publicly available.

26. The overall responsibility for climate change policymaking lies within the German Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), and a number of national institutions such as the Federal Ministry for Economic Affairs and Energy (BMWi) are involved in the implementation of policies. The Federal Environment Agency provides the scientific basis and research, including the national inventory, and sectoral agencies and the Treasury are responsible for the sectoral policy administration. The Bundestag is the lower house of parliament where federal laws are adopted; in circumstances where federal decisions have a regional impact, the Bundesrat (upper house) must also be consulted. The NC6 provided limited information on how the wider climate change strategy (including the non-energy sectors) is developed and agreed at the federal and regional levels, and on which agencies are responsible for monitoring and enforcement. The ERT encourages Germany to elaborate further on government, inter-agency and regional PaMs decision-making processes in the next NC.

27. The NC6 outlines the German Government's new monitoring and evaluation process, which will regularly review the implementation of measures set out in the Energy Concept (the main framework for energy) (see para. 34) and progress made towards its long-term climate and energy goals. However the Energy Concept focuses on the energy sector; the NC6 does not report on any overarching climate change strategy and monitoring processes that include non-energy PaMs.

28. Germany provided an extensive list of some of the activities and projects in place at the regional government level (Länder); however, it was not clear as to how these policies may relate back to the federal government, including whether funding is provided from the federal government to the regional and local government. There was no clear explanation of the competencies or boundaries within some of the federal and regional/local governments with regard to climate change PaMs (e.g. public transport, building standards and monitoring, and forestry protection). Furthermore, it was not always clear whether the PaMs implemented at regional level were included in the effect of PaMs either aggregated or individually. The ERT encourages Germany to describe the competencies of the different levels of government (federal, regional and local).

29. Germany provided a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto

Protocol also contribute to the conservation of biodiversity and the sustainable use of natural resources. The forestry law of 1975 was revised in 2010 with an emphasis on increasing the monitoring of forests from every 10 years to every 5 years to comply with reporting requirements under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The government provides subsidies to increase afforestation and particularly mixed stands of forest to enhance biodiversity and peatlands. Specific project funding to support the enhancement of biodiversity is reported in section 7.3.1 of the NC. The ERT noted during the review that Germany is doing a lot in the way of promoting forestry and biodiversity. However, little information on this is reported in the NC6 and the ERT encourages the Party to enhance its reporting on this matter in its next NC.

B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

30. Germany has provided in its NC6 comprehensive information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol.

1. Policies and measures related to implementation of commitments under the Convention

31. In its NC6, Germany reported on its PaMs adopted and implemented in achieving its commitments under the Convention. Germany provided complete information on PaMs by sector and by gas and a description of the principal PaMs. Germany has also provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals in accordance with the objective of the Convention (including reporting a 'with measures' projections scenario to 2030). The NC6 contains a set of maintained PaMs similar to those in Germany's NC5, with some amendments, enhancements and additions.

32. In its NC6, Germany reported on its policy context, national targets and objectives set to implement its commitments under the Convention, reflecting Germany's most recent climate change goals outlined in its 2010 Energy Concept. Germany indicates that a total of 180 measures have been implemented or initiated to date, giving priority in its NC6 reporting to principal PaMs adopted and implemented at the national (federal) level, including those under EU regulations and directives, and on PaMs influencing international aviation and shipping emissions.

33. The NC6 provides a detailed description of PaMs, including objectives, type and, where available, impact on GHG emission reductions. However, the ERT noted that while the description is detailed for energy-related PaMs, it is limited in the non-energy sectors (see para. 77 below) and the ERT recommends that Germany provide further details on non-energy-related PaMs, especially in the agriculture sector, in its next NC. Also, Germany did not report the individual effects of non-energy-related PaMs. The ERT encourages Germany to increase the transparency and completeness of its reporting on PaMs by including this information in its next NC.

34. The NC6 outlines the Government of Germany's new monitoring and evaluation process, which will regularly review the implementation of measures set out in the Energy Concept and progress towards its long-term climate and energy goals. The first annual monitoring report was published in December 2012, and Germany has committed to publishing a more extensive report every three years, starting at the end of 2014. Monitoring reports are jointly prepared by BMWi and BMUB, supported by the Federal Network Agency and with input from an independent commission comprising four

renowned energy experts. Once approved by the federal cabinet, these reports are sent to parliament.

35. The NC6 outlines high-level information on the structures and working processes for steering and coordinating efforts under the Energy Concept; however, limited information is provided on Germany's decision-making process, in particular on how PaMs are designed, implemented and adjusted. The ERT finds that limited information is provided on the status and modifications to PaMs since the NC5, but notes that Germany has maintained a stable package of PaMs since the NC5 with no discontinued PaMs and many enhancements over time to meet Germany's increased ambition (e.g. amendments to the Energy Savings Ordinance and the step-by-step tightening of building standards).

36. During the review, Germany provided additional information on the role of its federal ministries in developing and implementing PaMs, achieving the renewable energy/energy efficiency targets under the Energy Concept as well as EU targets, and assessing progress made towards these targets. Additional information was also shared on estimation methods[6] and the wider direct and indirect impacts of Germany's key PaMs, including the use of auctioning revenues to support climate change activities, reduced dependence on fossil fuels, improved electricity supplies in rural areas, and improved air quality.

37. The ERT encourages Germany to increase transparency by being as detailed as possible in its next NC with regard to Germany's policymaking processes, the roles of implementing entities, the level of governance at which PaMs are implemented and the costs of PaMs. Germany is also encouraged to share greater detail on how PaMs are believed to be modifying long-term GHG emission trends (through quantified evidence on the uptake of measures, changes in activity levels and progress against sectoral targets, etc.), together with insight on success factors and elements of PaMs that may be considered innovative and replicable.

38. The ERT noted that information related to PaMs was spread across a number of sections and that the organization of future NCs could be improved through the greater use of cross-referencing between sections and with the previous NC. The ERT also noted some minor errors and inconsistencies in the reporting of the effects of PaMs, which have been corrected in the October 2014 resubmission of Germany's NC6. The ERT suggests that Germany undertake quality checks to minimize these in future.

39. Many of the encouragements made in the previous review report have been taken into consideration by Germany in the NC6; for example, the inclusion of summary tables on PaMs by sector as well as information on monitoring and evaluation and on the influence of PaMs on emissions in the international transport sector.

2. Policy framework and cross-sectoral measures

40. Germany's climate change PaMs have evolved over the past three decades, most recently in pursuit of an integrated approach towards climate change and energy. The latest policy framework for Germany's climate and energy policy is the 2010 Energy Concept, which outlines Germany's vision for an energy policy transition up to 2050, where the key objectives are security of supply, affordability and environmental soundness. The Energy Concept outlines integrated climate and energy targets, including domestic targets to reduce total GHG emissions from 1990 levels by 40.0 per cent by 2020, 55.0 per cent by 2030, 70.0 per cent by 2040 and 80.0 to 95.0 per cent by 2050. The central strategic pillars

[6] Fraunhofer Institute et al. (2013), Bürger et al. (2013) and Harthan and Koch (2012).

involve advancing renewable energy, modernizing the power grids and increasing energy efficiency.

41. Following the Fukushima Daiichi nuclear power plant disaster in Japan in March 2011, the role of nuclear energy in Germany's energy mix was re-evaluated and a decision taken to permanently shut down seven of Germany's oldest nuclear plants and to phase out nuclear power by 2022. Consequently, in June 2011 additional measures were added to Germany's Energy Concept and an acceleration of its implementation was agreed.

42. There is no legal basis for Germany's climate change targets; these are set out in government decisions, not in legislation. According to information provided by Germany during the review, Germany's latest coalition agreement (of December 2013) confirms the 2020 and 2050 climate change targets.

43. Germany also elaborated on the EU climate change targets and ESD under EU legislation. This includes an EU-wide cap on emissions covered by the EU ETS and a legally binding 2020 target for Germany's non-ETS sectors under the ESD of a 14.0 per cent reduction on 2005 levels. The ERT noted that these EU targets, interpreted as a 33–34 per cent GHG emission reduction by 2020, are less ambitious than Germany's national target (40.0 per cent reduction).

44. During the review, Germany provided additional information on future policy developments, noting that a Climate Action Programme 2020 is under preparation and will outline additional measures (to be submitted to the cabinet in November 2014) to achieve the ambitious domestic GHG reduction target (see para. 93 below). Germany also informed the ERT that it will publish a Climate Policy Plan 2050 by 2016.

45. Germany's package of PaMs reflects a mix of legislated and regulatory measures, fiscal and market-based instruments, funding programmes and voluntary measures. Key legislation supporting Germany's climate change goals are the Renewable Energy Sources Act, the Energy Saving Act, the Energy Industry Act and the Grid Expansion Acceleration Act.

46. In its NC6, Germany reports on its key cross-sectoral PaMs. Germany's main measure is the EU ETS. This EU-wide cap-and-trade system covers approximately half of Germany's GHG emissions, notably power generation and industry. The existing EU-wide cap on 2013–2020 GHG emissions will decline on a linear trajectory at a rate of 1.74 per cent per year on 2010 levels to achieve an overall EU reduction of 21.0 per cent by 2020 (from 2005 levels). Germany does not intend to draw on the accounting elements of the EU ETS cap or the use of credits to achieve its national targets. The EU ETS supports emission reductions and progress towards Germany's national target through raising companies' awareness of carbon costs which are then reflected in investment decisions. Energy taxation – in particular through the 2006 Energy Tax, which consolidates all tax-related legislations covering fossil fuel and renewable energy – is outlined as another key cross-sectoral measure.

47. Germany supports the implementation of its climate and energy targets through a number of funding programmes, principally the overarching Special Energy and Climate Fund, which is financed through EU ETS auctioning revenues to support domestic and international efforts. Funds are channelled through various initiatives including the National Climate Initiative, which received EUR 900 million in 2008–2011 to promote societal progress and technological innovations, and the Energy Efficiency Fund, which received EUR 89 million in 2012.

48. Germany places significant emphasis on research and development as a supporting measure to its climate and energy strategy, most recently captured in the 2011 Sixth Energy Research Programme.

49. In its NC6, Germany outlines that legislative authority is divided between the national government and the 16 federal states, noting that all 16 "Länder" (and some local authorities) have developed their own climate change programmes and plans, including two which have climate protection acts. Germany reports an extensive list of Länder activities and targets in its NC6. Table 4 provides a summary of the reported information on the key national PaMs of Germany.

Table 4
Summary of information on key policies and measures reported by Germany

Sectors affected	*List of key policies and measures*	*Estimate of mitigation impact in 2015(kt CO_2 eq)*	*Estimate of mitigation impact in 2020 (kt CO_2 eq)*
Policy framework and cross-sectoral measures			
	Energy Concept 2010 and 2011 amendments	NE	NE
	European Union Emissions Trading System (EU ETS)	5 000 (energy) 760 (industry, trade, commerce and services sectors)	3 000 (energy) 1 520 (industry, trade, commerce and services sectors)
	Special Energy and Climate Fund	NE	NE
Energy	Various measures to promote electricity savings (incl. Energy Consumption Labelling Act, minimum efficiency requirements and energy advice scheme)	16 000	28 000
Energy supply	Payment for avoiding use of the grid as well as the expansion of the grid (amendments to the Energy Industry Act and Grid Expansion Acceleration Act)	NE	NE
	Combined Heat and Power Act and the promotion of micro combined heat and power	1 000	4 000
Renewable energy	Renewable Energy Sources Act	7 000 (energy) 50 (buildings)	14 000 (energy) 280 (buildings)
	Biofuel blending	2 800	5 100
Energy efficiency	Energy Saving Ordinance	1 070	1 550
Residential and commercial sectors	KfW Development Bank programmes for energy-efficient construction and refurbishment	2 390	3 840
	Market Incentive Programme	420	700
	Special Fund - Energy Efficiency for SMEs	680	1 120
Transport	European Union (EU) regulation on CO_2 emission standards for cars and light commercial vehicles	1 100	2 600
	Increased efficiency in aviation	1 600	3 300
Industrial sectors	N_2O point sources in the EU ETS, regulation of and voluntary agreements for fluorinated gases (F-gases) and replacement of F-gases	NE	NE
Agriculture	EU nitrates directive and Common Agricultural Policy reforms	NE	NE
Forestry	Forestry law and funding for afforestation and forestry research	NE	NE

Sectors affected	*List of key policies and measures*	*Estimate of mitigation impact in 2015 (kt CO_2 eq)*	*Estimate of mitigation impact in 2020 (kt CO_2 eq)*
Waste management	Waste minimization (Closed Cycle Management Act), energy recovery from waste, recovery of biowaste and pre-treatment of all waste before landfill	NE	NE

Note: Key PaMs outlined above reflect PaMs reported in Germany's NC6 that are most significant in terms of estimated impact on greenhouse gas emissions in 2020 and those outlined by Germany as being key measures (the list is not exhaustive).

Abbreviations: NE = not estimated or reported, PaMs = policies and measures.

3. Policies and measures in the energy sector

50. The energy sector contributes the largest share of Germany's total GHG emissions, accounting for 83.7 per cent in 2012. Between 1990 and 2012, GHG emissions from the energy sector decreased by 22.9 per cent (232,996 kt CO_2 eq). Reductions have been observed in all subsectors, with the overall trend driven by reductions from the residential and commercial sectors and in the industrial sector.

51. ***Energy supply***. Total primary energy supply (TPES) decreased 11 per cent from 1990 levels, totalling 312.5 million tonnes of oil equivalent in 2012. Energy intensity of production (measured as a ratio of TPES to GDP) has declined, falling 35.7 per cent between 1990 and 2012, while per capita TPES has also decreased by 14.0 per cent over 1990–2012.

52. While the use of renewable energy has increased remarkably, from 1.4 per cent to 11.3 per cent of TPES over 1990–2012 (see para. 55), fossil fuels still dominate, accounting for 80.4 per cent of TPES in 2012 (declining slightly from 86.4 per cent in 1990). Within the energy mix there has been a shift from coal (lignite and hard coal) to gas, and nuclear energy has recently declined, accounting for 8.3 per cent of TPES in 2012 (compared with 11.2 per cent in 2010), owing to the 2011 decision to phase out nuclear energy.

53. Energy industries contributed 38.8 per cent of total GHG emissions in 2012, representing the largest share of Germany's energy-related emissions. The level of emissions in this sector has declined by 14.6 per cent (62,191 kt CO_2 eq) over 1990–2012. While electricity generation in Germany increased by 12.0 per cent between 1990 and 2012, emissions fell owing to changes in the electricity generation mix. Renewable energy increased to 23.5 per cent of total generation in 2012, natural gas doubled and there has been a corresponding reduction in lignite/coal-fired generation and nuclear energy. In 2011 and 2012 more electricity was generated from renewables than from nuclear energy. This has been driven by the EU ETS, the abolition of the natural gas tax, the Renewable Energy Sources Act and amendments to phase out nuclear energy. Germany has successfully managed this energy transition to date, replacing nuclear energy with renewables while maintaining a stable and reliable electricity supply.

54. Upgrading and expanding the electricity grid is one of the central pillars of Germany's energy strategy. Amendments to the Energy Industry Act and the Grid Expansion Acceleration Act support greater grid connectivity and integration of renewables, including offshore wind. These measures are expected to play a key role in managing Germany's energy transition, together with complementary demand-side energy efficiency measures.

55. ***Renewable energy sources***. Renewable energy is critical to Germany's Energy Concept. Under the EU renewable energy directive, Germany has a legally binding target to

achieve an 18.0 per cent share of renewable energy sources by 2020. Germany has also set national targets of 35.0 per cent renewables in the electricity sector by 2020, and 2050 targets on achieving a share of renewables of 60.0 per cent in total energy and an 80.0 per cent share in electricity generation. Germany is making progress in transitioning to renewable energy; renewable energy constituted a 12.7 per cent share of total energy in 2012.

56. The share of renewables has been growing in all sectors, but it is growing the fastest in the electricity generation sector, where renewables as a share of final electricity consumption reached 25.4 per cent in 2013. Wind energy is the main contributor, followed by bioenergy, photovoltaics and hydroelectric power. The NC6 forecasts that renewable sources will contribute 34.4 per cent of electricity generation in 2020. The main policy supporting this transition is the Renewable Energy Sources Act, which creates incentives and integrates renewables into the energy mix. Amendments made in 2014, which were explained during the review, take Germany towards increased market-based and flexible approaches, providing renewables with priority access to the grid, replacing feed-in tariffs with feed-in premiums, and setting technology-specific support levels that are flexible vis-à-vis market developments.

57. The heat sector has also experienced a rise in renewable energy, reaching 9 per cent of total heat supply in 2013. This has been driven by the Renewable Energies Heat Act, which requires that renewable energy sources supply a portion of the energy consumption for heating and cooling in new residential and non-residential buildings (from 2009), and in existing public buildings (through a 2011 amendment). The Market Incentive Programme supports the implementation of this, providing grant and loan financing.

58. ***Energy efficiency***. Energy efficiency is also a central pillar of Germany's energy transition. Germany aims to reduce energy consumption compared with 2008 levels by 20.0 per cent by 2020 and by 50.0 per cent by 2050. During the review, Germany recognized that progress has been limited, with a 3.3 per cent reduction in energy consumption achieved between 2008 and 2013. Germany's National Energy Efficiency Action Plan is currently under development (to be adopted in December 2014). PaMs related to energy efficiency cover appliances, buildings (see para. 60) and industry (see para. 67).

59. The main PaMs related to energy efficient appliances and consumer products include: the Energy Consumption Labelling Act and Ordinance, which transposes the EU directives on labelling and product standards, the minimum efficiency standards (from the EU ecodesign directive) covering household appliances, and the introduction of smart meters to measure electricity consumption. These measures are estimated to lead to significant electricity demand reductions and savings of 28,000 kt CO_2 eq in 2020.

60. The German Government seeks to lead by example on energy efficiency. It has nearly completed a long-term energy refurbishment plan for its federal buildings.

61. ***Residential and commercial sectors***. Direct GHG emissions in the residential and commercial sectors account for 14.9 per cent of total emissions in 2012 and have decreased at a steady and significant rate, falling 36.4 per cent between 1990 and 2012. The Energy Savings Act and Ordinance governs regulations for minimum energy standards for new construction and existing buildings undergoing significant refurbishment, subject to economic efficiency criteria. These standards, which came into force in the late 1970s, have been made stricter over time, such that the latest 2013 amendments will apply to all new buildings in Germany from 2021 and to new public buildings starting in 2019, where the strictest building energy standard is similar to that of a climate-neutral building.

62. Germany supports the uptake of energy efficiency and renewable technologies through a range of funding measures. The NC6 highlights that 3.1 million residences and more than 1,600 buildings at municipal level have received support since 2006. Programme

funding totalling EUR 1.5 billion per year is available from the Special Energy and Climate Fund over 2012–2014, and EUR 300 million per year over 2013–2020 finances KfW Development Bank's[7] provision of loans and grants under the Energy Efficient Construction and Refurbishment Programmes. The Energy Efficiency Fund supports measures in small and medium sized enterprises (SMEs). There is also a range of supporting measures, such as energy performance certificates, information and advisory services. The combined effect of PaMs is estimated to reduce GHG emissions in the residential sector by 7,550 kt CO_2 eq in 2020 (over half attributed to KfW programmes).

63. During the review, the ERT noted that the refurbishment of the existing building stock needs to be a critical part of Germany's transition, given that 67 per cent of existing residences were built before the first energy efficiency regulations. However, renovation rates are currently below target and need to be increased.

64. ***Transport sector***. Transport-related GHG emissions account for 16.6 per cent of Germany's total GHG emissions in 2012. Emissions have decreased by 5.6 per cent over 1990–2012, initially peaking substantially in 1999 before a steady decline from 2000 owing to improved fuel efficiency of new vehicles and an increase in diesel cars. A major factor in this success is the EU regulation on CO_2 emission standards for new cars and new light commercial vehicles, supported by measures such as the German passenger car label to encourage the purchase of more efficient vehicles and the environmental tax reform. In its NC6, Germany also noted that the tax reform has led to increased refuelling in neighbouring countries, reducing fuel sales in Germany.

65. A further key success factor has been the increase in biofuels supported by the Biofuel Quota Act, which set a 6.25 per cent quota on the energy content of fuel by 2014. To date, the transport sector has seen an increase in biofuels, reaching 5.3 per cent of the total energy supply in 2013. From 2015, Germany will use a GHG reduction quota instead.

66. Overall, domestic transport PaMs are estimated to lead to significant future GHG savings of 15,200 kt CO_2 eq in 2020, of which approximately a third is attributed to increased biofuels. Germany has also set ambitious goals for one million electric vehicles on Germany's roads by 2020, rising to six million by 2030. It was outlined during the review week that achieving these goals will be challenging.

67. ***Industrial sector***. Industry accounts for approximately 30 per cent of Germany's GDP, and 12.3 per cent of energy-related GHG emissions in 2012. Key PaMs in the industrial sector include the EU ETS (which covers the energy-intensive sectors, such as metals, cement, glass and paper and most recently chemicals and non-ferrous metals, and is outlined as a cross-sectoral measure in para. 46 above), energy taxation "capping", which encourages energy management and efforts to increase efficiency through energy intensity targets, and the promotion of combined heat and power.

4. Policies and measures in other sectors

68. Between 1990 and 2012, GHG emissions from industrial processes (including solvent and other product use), agriculture and waste decreased by 33.2 per cent (75,969.66 kt CO_2 eq), mainly owing to reductions in waste, industrial processes and agriculture. The GHG emission trends from the different sectors included here is provided in the following paragraphs. The effects of PaMs implemented by the Government of Germany are quantified in terms of their effect on the emission level for some of the non-energy sectors. The ESD target to reduce non-ETS emissions by 14.0 per cent compared

[7] KfW Development Bank is owned by the German Government.

with 2005 by 2020 includes agricultural emissions of N_2O and CH_4, industrial processes and waste, among other things.

69. ***Industrial processes***. Between 1990 and 2012, GHG emissions from the industrial processes sector (including solvent and other product use) decreased by 29.1 per cent (28,687.71 kt CO_2 eq), mainly owing to reductions in the chemical industry and metal production.

70. Germany's PaMs in the industrial processes sector include the introduction of N_2O point sources in the EU ETS as well as regulations and voluntary agreements to reduce the usage and leakage of fluorinated gases (F-gases).

71. Joint implementation projects have been in place since 2009 to reduce N_2O emissions from nitric acid production. Starting in 2013, N_2O point sources (production of adipic and nitric acid as well as glyoxal and glyoxylic acid) will be included in the EU ETS. These measures are expected to reduce emissions from nitric acid production by 50 per cent and adipic acid production by 90 per cent. Furthermore, F-gas emissions from the primary aluminium industry have also been included in the EU ETS. Germany has not reported quantified emission reductions in absolute terms.

72. Germany has in place voluntary and regulatory maintenance and leakage checks for equipment containing more than 3 kg of F-gases in accordance with EU Regulation (EC) 842/2006 on F-gases and Germany's Chemicals and Climate Protection Regulation. In addition, Germany prohibits the use of some HFCs in equipment such as fire protection equipment and noise insulation panels in accordance with EU Regulation (EC) 842/2006. Germany also provides funding to replace HFCs with coolants having lower global warming potentials (GWPs) (< 150) in cars and other vehicles under regulations required by EU directive 2006/40/EC.

73. ***Agriculture***. Between 1990 and 2012, GHG emissions from the agriculture sector decreased by 20.9 per cent (18,330.86 kt CO_2 eq), mainly owing to reductions in emissions from enteric fermentation and agricultural soils from a reduction in non-dairy and dairy cattle numbers.

74. The main PaMs in the agriculture sector include Germany's transposition of EU environmental regulations and directives that are not necessarily driven by climate change. For example Germany reports as PaMs in the agriculture sector the EU nitrates directive and the direct linking of payments under the new European Union Common Agricultural Policy (EU CAP) reforms to environmental and land-use criteria.

75. The EU nitrates directive has been transposed into Germany's 2009 Fertilizer Act. This Act will reduce the upper limit of field nitrogen surpluses from 60 kg nitrogen/hectare/year to 50 kg nitrogen/hectare/year by 2020, and limit additions of biogas digestate to 170 kg nitrogen/hectare/year. The Act also requires effluent slurry to be applied to bare soil immediately (currently within four hours).

76. The new EU CAP reforms create stronger links between direct payments and environmental and climate change objectives. Farmers will be required to set aside 5.0 per cent of farmland as fallow or green belts. Thirty per cent of direct payments to farmers will be subject to compliance with new agricultural policies that are good for the environment.

77. Germany presented an aggregated estimate of the reduction of emissions from the agriculture sector. Although not clearly explained, most of the emission reductions appear to be related to the reduction in the use of nitrogen on agricultural soils via the Fertilizer Act. It was not clear how the PaMs in agriculture, particularly under the EU CAP, directly reduce GHG emissions from agriculture. Furthermore, it was not clear as to which agency or level of government was implementing and monitoring the policy or how the policy

would be enforced. During the review, Germany explained that the Fertilizer Act would be monitored by using national statistics on nitrogen inputs.

78. The ERT recommends that Germany, in its next NC, improve the descriptions of PaMs for the agriculture sector and encourages Germany to elaborate on how agricultural PaMs are related to climate change policy, including a description of monitoring and enforcement processes, and to report the effects of the individual PaMs on emissions in the agriculture sector.

79. ***LULUCF***. The LULUCF sector was a net sink of 3,487.84 kt CO_2 eq in Germany in 2012 and net GHG removals decreased by 21,030.24 since 1990. The trend was mainly driven by decreases in removals from forest land. Between 2002 and 2008, there was a large decrease in removals from forest land remaining forest land. Removals have started increasing since 2008 but have not returned to pre-2002 levels.

80. The forestry law of 1975 was revised in 2010. The Law supports afforestation projects and requires approval by the Länder for permanent or temporary deforestation. The Law also provides for the monitoring and reporting of the national forestry inventory every ten years, with additional monitoring at five years (in accordance with the 2010 revision) of compliance with reporting requirements under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

81. The federal states of Germany are to provide funding of up to several million euros per year for peatland conversion programmes. In addition, within the EU CAP 2013-2020, payments are planned for the conversion of cropland to grassland, and peatland certificates for voluntary markets are running.

82. PaMs in the LULUCF sector also include improving the scientific basis (e.g. introduction of climate education into forestry courses) and increasing subsidies to convert pure single stand forests into mixed stand forests, the afforestation of agricultural land and the reforestation of forest land after natural disturbances. Funding of up to EUR 18.2 million has been provided for forestry adaptation, restoration of wetland forest stands, climate change information and education activities in forestry, and carbon-efficient resource management.

83. The ERT encourages Germany to elaborate how PaMs in the LULUCF sector are developed, including institutional arrangements for the monitoring and evaluation of LULUCF PaMs over time, and how and by whom the LULUCF PaMs are enforced.

84. ***Waste management***. Between 1990 and 2012, GHG emissions from the waste sector decreased by 68.1 per cent (28,951.09 kt CO_2 eq), mainly owing to reductions in solid waste disposed on land. Germany has a comprehensive set of PaMs in the waste sector that are designed to reduce waste disposal and promote the use of waste gas and waste incineration for energy production. The main legislation governing waste management is the Closed Cycle Management Act (2012). Since 2005, waste to landfill has been prohibited unless the waste has been pre-treated.

85. Germany has a five-step process to reduce solid waste, which includes preventing waste at the consumer level, promoting reuse and recycling, and finally implementing other waste recovery and disposal systems.

86. Germany has been trialling biowaste collection, and from January 2015 there will be mandatory national biowaste collection. The biowaste will be used to produce biogas for energy generation and organic waste for compost.

87. Germany prohibits waste incineration by law unless the waste is burned for producing electrical and heat energy. In 2011 there were 70 waste incineration plants which

produced 4,950 GWh of electricity and 7,600 GWh of heat. This amounted to an estimated reduction in GHG emissions of 6,000 kt CO_2 eq by replacing fossil fuels.

88. Waste sector policies are implemented at the local community level, and the enforcement of the waste policies is conducted by the federal states (Länder). Statistics gathered by the German Statistics Office are used to monitor the PaMs.

89. In the NC6, waste sector policies were mainly reported under the national circumstances section, which provided good technical details on the specific PaMs in the waste sector. However, there was limited information on the implementation, monitoring and enforcement of the PaMs. Germany reported only the aggregated effect of PaMs in the PaMs section. The ERT noted that the national circumstances section of NC6 also contained some historical estimates of emission effects due to waste PaMs (e.g. for waste incineration for 2011). The ERT encourages Germany to: (i) elaborate on how the PaMs in the waste sector are allocated between the federal government, Länder and local level and how and by whom the policies are monitored and enforced; (ii) present projected estimates of emission reductions for individual PaMs in the waste sector; and (iii) provide a cross reference to the relevant material from the PaMs section.

5. Policies and measures related to the implementation of commitments under the Kyoto Protocol

90. Germany reported on its package of PaMs adopted, implemented and elaborated in achieving its commitment under the Kyoto Protocol.

91. The NC6 includes information on how Germany promotes and implements the International Civil Aviation Organization (ICAO)/International Maritime Organization (IMO) decisions to limit emissions from aviation and marine bunker fuels. Germany provides details on its participation in these two processes, including through proposals and its engagement in technical working groups. Following the 2011 IMO decision, Germany is now implementing the Energy Efficient Design Index measure requiring progressive CO_2 reductions for new ships. Reflecting that many decisions under the ICAO and IMO are not yet taken or mandatory, Germany has reported on voluntary measures included in its key PaMs in the transport sector and outlined activities and discussions underway at the European level. The ERT commends Germany for its reporting in this area.

92. In its NC6, Germany reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts, on other Parties, especially developing country Parties. Further information on how Germany strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, as reported in the 2014 annual submission, is presented in chapter III.B below.

C. Projections and the total effect of policies and measures, including information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

93. In its NC6, Germany has provided a great deal of information on its GHG emission projections, including a 'with measures' scenario up to 2030. During the review, Germany provided further information on how it intends to close the gap with the domestic mitigation goal that was set for 2020. Germany plans to make its climate policy more ambitious through the launch of a set of measures under the umbrella of a Climate Action Programme 2020. According to a provisional repartition of efforts by sectors shared with

the review team, the largest additional reductions from this set of measures are expected from energy production, but all sectors are expected to contribute through additional reductions.

1. Projections overview, methodology and key assumptions

94. The GHG emission projection provided by Germany in the NC6 corresponds to a 'with measures' scenario until 2030. The overall results (excluding LULUCF for which no projection was submitted) relative to actual inventory data for 1990 are only outlined in the executive summary of the NC6. Results by sector (including reductions relative to 1990, 1995, 2000, 2005 or 2010, depending on the sector) are presented in the section containing projections. Projections are presented on a sectoral basis, using the same sectoral categories used in the PaMs section and, for the emissions not associated with any energy consumption, on a gas-by-gas basis for the following GHGs and groups of GHGs: CO_2, CH_4, N_2O, PFCs, HFCs and SF_6. Projections are also provided in an aggregated format for each sector using GWP values from the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Emission projections related to fuel sold to ships and aircraft engaged in international transport were not included in the totals, and are accounted for separately, although this is not explicitly indicated within the NC6. The projections section of the NC6 does not include information required by the UNFCCC reporting guidelines on NCs on the presentation of the results of projections aggregated and by gas; however, the information is provided in the first biennial report (BR1).

95. During the review, Germany provided additional information, elaborating on the projection report submitted in 2013 by Germany to the European Commission (in German), which was available to the public and referenced in the BR1. This report contains detailed information on the 'with measures' scenario, including underlying parameters and indicators and associated PaMs, as well as the results of emission projections at sectoral level as well as for EU ETS sectors and non-ETS sectors, separately.

96. The ERT recommends that Germany improve the completeness of the report by reporting scenario results both aggregated and by gas within the projections section of the NC6 itself. The ERT also encourages Germany to provide a more consistent view of the sectoral reductions relative to actual inventory data by providing the same inventory years for reference in the sector tables (e.g. tables 47, 48, 61, 62, 63, 65, 66, 67 and 68 of the NC6).

97. The scenarios are constructed based on measures initiated up to October 2012, as indicated in the PaMs section of the NC6.

98. Germany did not report on the changes to the methodology compared with the NC5, but provided supporting documentation during the review. In the NC5, as well as the NC6, Germany used a bottom-up approach based on an integration of results provided by sectoral submodels to describe the characteristics of energy supply and demand. Although the general modelling approach has not changed, some submodels have changed; for instance, the INVERT model is used to describe the energy demand in the building sector in place of IKARUS, but it is difficult to assess what impact this modification has on the results of the projection.

99. In the NC6, assumed prices on the fossil fuels market are higher than those used in the NC5 (more than two times higher for 2015 and 2020 for the price of a barrel of oil when expressed in EUR). Assumptions regarding the price of coal and gas are also higher, though the increase is less steep (20.0 per cent and 50.0 per cent, respectively, at the horizon 2015–2020, when expressed in EUR). These assumptions have been updated based on the more recent economic development known at the time of the reporting on projections.

100. Although the report mentions that sensitivity analyses were done for a number of decisive assumptions (population trends, economic development, energy prices, etc.), only the results of a sensitivity analysis on the growth of GDP was presented, and not within the projections section but in the section on national circumstances (under section 1.5.4). This analysis indicates that, while the main assumptions of GDP growth leads to a 32.8 per cent reduction from 1990 to 2020, the reductions in GHG emissions would reach 34.8 per cent if a slightly lower growth assumption than the one assumed in the 'with measures' scenario was taken into consideration (of 0.3 per cent per year from 2011 onward, that is to say of 3 per cent by 2020).

2. Results of projections

101. In the executive summary of the NC, Germany indicated that, according to preliminary data on 2012 emissions, it achieved a total average reduction of 24 per cent compared with the Kyoto Protocol base year during the period 2008–2012. This means that it has more than fulfilled its Kyoto Protocol commitment through domestic efforts. These results were confirmed by the latest GHG emission inventory provided during the review. Although Germany does not mention the use of accounting for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the NC6, those activities result in an additional net sink according to the inventory report submitted in 2014.

102. Germany's Kyoto Protocol target for the second commitment period (2013–2020) is a joint target for the EU and its 28 member States and Iceland. The target is to reduce emissions by 20.0 per cent in the period 2013–2020 compared with the Kyoto Protocol base year level. Under the Convention, Germany's target is also a joint target for the EU and its 28 member States: a 20.0 per cent reduction by 2020 compared with 1990. The EU targets are split into the EU ETS (which is an EU-wide target and it is expected that the market mechanism of the EU ETS will guarantee that emissions from sectors under this scheme will achieve the 2020 target) and non-ETS sectors (see para. 43); for sectors not covered by the EU ETS, the target for Germany is a reduction of 14.0 per cent between 2005–2020 under the ESD. In addition, Germany has set itself an ambitious domestic target of a 40.0 per cent reduction by 2020 compared with 1990.

103. Germany reports in its NC6 that current PaMs are projected to reduce total GHG emissions by 32.9 per cent on 1990 levels by 2020. According to information provided during the review and contained in the 2013 projections report (see para. 95), emissions from the non-ETS sector are projected to decrease to 437,850 kt CO_2 eq in 2020 compared with the target of 437,600 kt CO_2 eq (based on the split between emissions covered by the ETS and the non-ETS sectors between 2008 and 2012 and the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*).[8] Although this was not indicated in the NC6, the ERT, taking note of the information provided during the review, considers that Germany is on track to achieve the target of the ESD with adopted and implemented PaMs.

104. Concerning the domestic target of a 40.0 per cent emission reduction, Germany noted that the projected emission reduction of 32.9 per cent is insufficient to achieve this target, with a shortfall of approximately 90,000 kt CO_2 eq in 2020. However, as outlined in paragraph 44 above, a Climate Action Programme 2020 is under preparation to close that gap.

105. While significant reductions were obtained for CH_4 and N_2O over the period 1990–2012, further reductions in those emissions are going to be more moderate in the period up

[8] Source: European Environment Agency. 2013. *Trends and projections in Europe 2013*. Available at <http://www.eea.europa.eu/publications/trends-and-projections-2013/full-report-ghg-trends-and-1>.

to 2030 according to the 'with measures' scenario (over the period 2010–2030: –3.5 per cent for N_2O and –22.6 per cent for CH_4). In contrast, the decrease of CO_2 emissions is assumed to continue at similar pace (–24.3 per cent from 2010 to 2030).

106. According to the details available in the 2013 projections report (see para. 95), at a sectoral level reductions of more than 15 per cent by 2020 compared with 2010 are expected for the energy production, waste, residential and tertiary sectors, and a reduction of approximately 40 per cent is expected by 2030 compared with 2010 for all of these sectors except for energy production (–32 per cent by 2030). For the other sectors, the emissions are either nearly stable over the whole projection periods (agriculture and industrial processes) or starting to decrease again only after 2020 (transport sector: –10 per cent by 2030). The projected emission levels under different scenarios and information on Germany's quantified economy-wide emission reduction target are presented in table 5 and the figure below. The Kyoto Protocol and Convention targets could not be presented as they correspond to joint commitments with other EU member States.

Table 5

Summary of greenhouse gas emission projections for Germany

	Greenhouse gas emissions (kt CO_2 eq per year)	*Changes in relation to the base year[a] level (%)*	*Changes in relation to the 1990 level (%)*
Kyoto Protocol base year[b]	1 232 429	NA	–1.3
Kyoto Protocol target for the first commitment period (2008–2012)	973 619	–21.0	–22.0
Kyoto Protocol target for the second commitment period (2013–2020)[c]	Not available yet		
Quantified economy-wide emission reduction target under the Convention[d]	Not available yet		
Domestic target	748 829	NA	–40.0
Inventory data 1990[e]	1 248 048	+1.3	0.0
Inventory data 2012[e]	939 083	–23.8	–24.8
Average annual emissions for 2008–2012[e]	941 315	–23.6	–24.6
'With measures' projections for 2020[f]	837 200	–32.0	–32.9
'With measures' projections for 2030[g]	718 700	–41.6	–42.6

[a] "Base year" in this column refers to the base year used for the target under the Kyoto Protocol, while for the target under the Convention it refers to the base year used for that target.

[b] The Kyoto Protocol base year level of emissions is provided in the initial review report contained in document FCCC/IRR/2007/DEU.

[c] The Kyoto Protocol target for the second commitment period (2013–2020) is a joint target for the European Union and its 28 member States and Iceland. The target is to reduce emissions by 20.0 per cent over the period 2013–2020 compared with the base year level. The target for sectors not covered by the European Union Emissions Trading System is –14.0 per cent by 2020 compared with 2005 for Germany under the European Union effort-sharing decision.

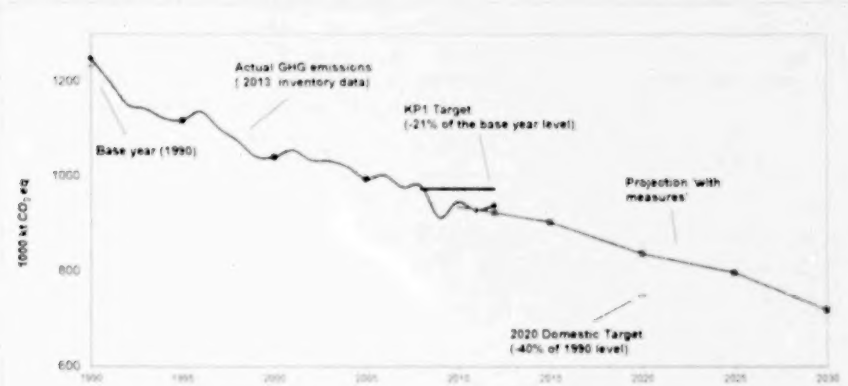
[d] Quantified economy-wide emission reduction target under the Convention is a joint target for the European Union and its 28 member States. The target is to reduce emissions by 20.0 per cent by 2020 compared with the base year (1990) level. On top of that, Germany has set itself a domestic target of reducing its emissions by 40.0 per cent by 2020 compared with 1990, which goes beyond the contribution needed to fulfil its commitment within the EU-wide target.

[e] Germany's 2014 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry (LULUCF).

[f] Germany's sixth national communication (NC6) and first biennial report (BR1). The percentage reduction is expressed in accordance with the Party's presentation, that is, relative to 1990 based on Germany's 2012 greenhouse gas inventory submission.

[g] Germany's NC6 and BR1. The percentage reduction is expressed in accordance with the Party's presentation, that is, relative to 1990 based on Germany's 2012 greenhouse gas inventory submission.

Greenhouse gas emission projections



Sources: (1) Data for the years 1990–2012: Germany's 2014 greenhouse gas inventory submission (the emissions are without land use, land-use change and forestry); (2) Projection data for the years 2010–2030: Germanys' first biennial report and additional data provided during the review (the emissions are without land use, land-use change and forestry). These data are coherent with the inventory submitted in 2012, which explains the slight inconsistencies regarding the emission level in 2010.

3. Total effect of policies and measures

107. In the NC6, Germany presents the estimated and expected effect of individual implemented and adopted PaMs, in accordance with the 'with measures' definition, compared with a situation without such PaMs. Information is presented in terms of GHG emissions avoided (on a CO_2 eq basis) in 2015, 2020, 2025 and 2030 (and 2010 for the transport sector). It also presents relevant information on factors and activities for each sector for the years 1990 to 2030. While the resubmitted NC6 includes information on the total effect of the implemented PAMs for 2015 and 2020, it is not presented in accordance with the UNFCCC reporting guidelines on NCs in terms of GHG emissions avoided or sequestered, by gas, in historic years. At a sectoral level, information on the impact of PaMs which are not directly associated with energy production or consumption is not provided, although the 'with measures' scenario does capture progress in industrial processes and waste treatment induced by PaMs introduced by Germany.

108. During the review, Germany provided additional information, elaborating on the evaluation of the total effect of PaMs, which resolved the lack of transparency and completeness highlighted in paragraph 107 above, except for the quantification of the impact of PaMs not related to the consumption of energy.

109. The ERT recommends that Germany improve the completeness and transparency of its reporting on projections by providing the disaggregation by gas (on a CO_2 eq basis) of the total effect of its PaMs, in accordance with the 'with measures' definition, compared with a situation without such PaMs, presented in terms of GHG emissions avoided or sequestered. The ERT encourages Germany to report reductions in a coherent way across sectors, including emissions not related to energy, to improve the transparency of the report. The ERT also encourages Germany to highlight the key principles of the methodology that was used (including on the way the interaction between PaMs is captured) and of the model components.

110. The total effect of PaMs is reported to amount to 47,600 kt CO_2 eq for the year 2015 and 82,400 kt CO_2 eq for the year 2020. According to the information reported in the NC6, PaMs implemented will deliver the largest emission reductions in the energy sector (stationary combustion), followed by the effect of PaMs implemented in the transport sector. Effects have also been estimated for some PaMs in industrial processes (F-gases) from 2020 onwards. The most effective PaMs and drivers behind GHG emission reductions are described in chapter II.B above. Table 6 provides an overview of the total effect of PaMs as reported by Germany.

Table 6
Projected effects of planned, implemented and adopted policies and measures in 2015 and 2020

Sector	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of planned measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of planned measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*
	2015				*2020*			
Energy (without transport)	38 500	4.5	NA	NA	59 800	7.0	NA	NA
Transport	9 100	5.5	NA	NA	15 200	9.2	NA	NA
Industrial processes	NA	NA	NA	NA	7 400	7.5	NA	NA
Agriculture	NA	NA	NA	NA	NA	NA	NA	NA
Land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA
Waste management	NA	NA	NA	NA	NA	NA	NA	NA
Total	**47 600**	**3.8**	**NA**	**NA**	**82 400**	**6.6**	**NA**	**NA**

Source: Germany's sixth national communication and additional data provided during the review.

Note: The total effect of implemented and adopted policies and measures is defined as the sum of effects of individual measures, taking into account overlaps and synergies.

Abbreviation: NA = not available.

4. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

111. Germany has not reported on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action, and how its domestic action thus constitutes a significant element of the effort made. However, the ERT noted that Germany, in the executive summary of the NC, expects to meet its Kyoto Protocol target based on its domestic emissions, although units were acquired by companies which are allowed to make use of these mechanisms to fulfil their own obligations under the EU ETS. The ERT recommends that Germany include in its next NC concrete information on whether it plans to use mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol.

D. Provision of financial resources and technology transfer to developing country Parties, including information under Articles 10 and 11 of the Kyoto Protocol

1. Financial resources, including "new and additional" resources and resources under Article 11 of the Kyoto Protocol

112. In its NC6, Germany provided information on the provision of support required under the Convention and its Kyoto Protocol. The information provided covers most of the issues on which information is required in the UNFCCC reporting guidelines on NCs. Germany did consider part of the recommendations provided in the review report of the NC5. As an example, in this submission, Germany includes a definition of "new and additional" financial resources that was not included in its NC5.

113. Germany plays a considerable role in assisting developing countries and countries with economies in transition. Germany remains the third largest contributor to the Global Environment Facility (GEF) and the largest donor to the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). Germany is contributing substantially through activities related to financial support, technology transfer and capacity-building. Nevertheless, these efforts are not fully reflected in the NC6, mainly because the information provided was not well structured and it was difficult to identify in the NC6. The ERT commends Germany for its improved reporting; however, to enhance transparency, the ERT recommends that Germany follow more closely the structure outline contained in the annex to the UNFCCC reporting guidelines on NCs when reporting on financial resources and transfer of technology, and include further information on technology transfer, capacity-building and private sector activities in its next NC (see para. 123 below).

114. In its NC6, Germany provided details on measures taken to give effect to its commitments under Article 4, paragraphs 3, 4 and 5, of the Convention as required by the UNFCCC reporting guidelines on NCs and under Article 11 of the Kyoto Protocol, as required by the "Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Germany has indicated which "new and additional" financial resources it has provided pursuant to Article 4, paragraph 3, of the Convention and clarified how it has determined such resources as being "new and additional". Germany defined "new and additional" with regard to its fast-start pledge as follows: "The funds represent an increase over climate-related funds in 2009 and come from an innovative source of finance such as revenue from emission trading." Germany included information regarding financial support provided, committed and pledged, as well as allocation channels and annual contributions in its NC6. Germany did include all information required under Article 7 of the Kyoto Protocol.

115. Germany has reported information on the assistance it has provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them to meet the costs of adaptation to those adverse effects. Furthermore, Germany has provided information on other financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels. In particular, Germany provided financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels, including the GEF, Forest Carbon Partnership Facility, Adaptation Fund, Trust Fund for Ecosystem-Based Adaptation and the United Nations Environment Programme (UNEP) Collaborating Centre for Climate and Sustainable Energy Finance.

116. Germany plays a considerable role in assisting developing countries and countries with economies in transition by providing financial aid through its well-developed

multilateral and bilateral climate finance programmes. Much of the bilateral support has been part of its official development assistance (ODA) support to developing countries. During the review, Germany provided information regarding climate finance for the years 2010–2013. The majority of Germany's contribution to bilateral and multilateral funding is for mitigation efforts. Yet the share of adaptation relevant funding has increased during the reporting period. In the case of mitigation projects, support is provided for the areas of energy production and supply, transport, forestry, agriculture, industry, waste management/disposal, and environment and biodiversity. Support is also provided for adaptation activities in the areas of water and sanitation, rural development, agriculture, environment and biodiversity, and projects such as on flood protection.

117. Germany has also provided information on its financial contribution to the Adaptation Fund (EUR 10.0 million in 2010) established in accordance with decision 10/CP.7. With regard to the most recent financial contributions (fast-start finance) to enhance the implementation of the Convention by developing countries, Germany had committed itself to provide EUR 1.26 billion for 2010-2012 and slightly exceeded the commitment, reaching EUR 1.289 billion of fast-start finance, with a balanced allocation between mitigation, adaptation and REDD-plus.[9] Germany has implemented the Initiative for Climate and Environment Protection, which was launched in 2008, and committed EUR 6.7 billion in the form of concessional loans. In addition, the International Climate Initiative supported 336 projects with total funds of EUR 860.0 million between its launch and March 2013. Table 7 summarizes information on financial resources.

Table 7

Summary of information on financial resources and technology transfer for 2010–2012 (only some figures for 2013)

(Millions of euros)

	Years of disbursement[a]			
Allocation channel of public financial support	*2010*	*2011*	*2012*	*2013*
German international climate finance[b]	1 431.0	1 560.0	1 663.0	1 780.0[c]
Contributions through multilateral channels, including:				
World Bank:				
Forest Carbon Partnership Facility (FCPF)	37.0	12.0	17.0	
Adaptation Fund	10.0			
Contributions to the Global Environment Facility[d]	86.8	86.8	86.8	
Contributions through bilateral and regional channels	1 187.0	1 274.0	1 396.0	
Contributions through United Nations bodies				
United Nations Development Programme – specific programmes:				
Thematic Trust Fund for Support to Energy and Environment for Sustainable Development	5.0			

[9] Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

Allocation channel of public financial support	*Years of disbursement*[a]			
	2010	*2011*	*2012*	*2013*
United Nations Environmental Programme (UNEP) – specific programmes:				
Trust Fund for Ecosystem-Based Adaptation	10.0			
UNEP Collaborating Centre for Climate and Sustainable Energy Finance			0.75	0.75
UNFCCC Supplementary Fund	4.9	3.4	3.4	
Contributions to the Green Climate Fund			0.2	

[a] Figures are commitments for all bilateral projects except Energy and Climate Fund (EKF), disbursements for EKF and multilateral projects.

[b] Information provided by the Party during the review in the brochure "Together for a common cause. Germany's contribution to international climate financing" by the German Ministry for Environment, Nature Conservation and Nuclear Safety and the German Ministry for Economic Cooperation and Development.

[c] Information provided during the review.

[d] Annual average for the years 2010–2014. Party declared that 40 per cent of this amount (EUR 34.7 million) was earmarked for the climate change funding category itself and for climate-related projects within other funding categories.

118. Germany also contributes to the multilateral funds for climate change. This includes its contribution to the GEF. Germany pledged EUR 347 million during the GEF Trust Fund's fifth replenishment period (2010–2014). A total of 40.0 per cent of that sum was dedicated to the climate change funding category itself and for climate-related projects within other funding categories. Germany's contribution accounts for 13.5 per cent of GEF funding, making it the GEF's third largest donor. Germany contributes to the LDCF with a pledge of EUR 115 million, and to the SCCF with a pledge of EUR 60 million, which makes it the largest donor to the LDCF and SCCF (up to March 2013).

119. Germany reported in its NC6 some information regarding its national approach for tracking the provision of financial support by providing the indicators and methodologies used. During the review Germany provided the ERT with additional information regarding the tracking of financial support.

120. Germany also provided in its NC6 information on how its resources meet the needs of Parties not included in Annex I to the Convention (non-Annex I Parties) in its examples of projects on adaptation to climate change, the reduction of GHGs and REDD-plus.

121. During the review, Germany provided additional information on private financial flows and the promotion of scaling up private financial flows. The information included a description of the financing instruments for climate protection and biodiversity, including on the International Climate Initiative (IKI), of which mobilizing private finance and sustainable business models is one objective. As part of this objective, IKI also set up the Global Climate Partnership Fund, which offers reduced-interest credit lines to finance institutions in selected partner countries. These can then be used to offer loans for investment in renewable energy and energy efficiency. The funds provided by the IKI serve as a "risk buffer" for private capital and create incentives for additional investment. Since it was set up in 2009, the Fund has received pledges from investors totalling USD 326 million, of which USD 243 million has already been invested.

2. Technology transfer, including information under Article 10 of the Kyoto Protocol

122. Germany has provided in its NC6 details on measures related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound

technologies, and has clearly distinguished between activities undertaken by the public sector and those undertaken by the private sector. In addition, Germany has reported in textual format on its activities related to technology transfer, including success stories and its activities for financing access by developing countries to 'hard' and 'soft' environmentally sound technologies. Furthermore, Germany has also reported in textual format on steps taken by the government to promote, facilitate and finance the transfer of technology and support the development and enhancement of endogenous capacities and technologies for developing countries. Germany provided in its NC6 examples of projects on adaptation to climate change, the reduction of GHGs and REDD-plus. A detailed review of reported information is provided in chapter II.D.3 of the report of the technical review of the first biennial report (FCCC/IDR.1).

123. During the review Germany provided additional information regarding these activities. Nevertheless, all values included in the tables of the NC6 correspond to public funds. Additionally, Germany did not use table 6 (Description of selected projects or programmes that promoted practicable steps to facilitate and/or finance the transfer of, or access to, environmentally sound technologies) from the UNFCCC reporting guidelines on NCs to report on activities related to technology transfer, including success and failure stories. The ERT recommends that Germany include the description of selected projects or programmes following the format of table 6 in the above-mentioned guidelines. The ERT also encourages Germany to report in its next NC on activities undertaken by the private sector, if relevant information is available, and on the ways in which it has encouraged private sector activities.

124. The information provided in Germany's NC6 on activities related to technology transfer and capacity-building was not well structured and the activities were difficult to identify. It was not clear whether the project examples provided in the NC6 involve technology transfer and/or capacity-building. In the text of the NC6 and also during the review, Germany explained that technology transfer and capacity-building activities are mostly integrated with mitigation and adaptation projects and that it considers technology transfer and capacity-building as an integral part of international cooperation. To improve transparency, the ERT encourages Germany to structure this information in a separate subsection so that information on technology transfer and capacity-building activities is easily identifiable.

E. Vulnerability assessment, climate change impacts and adaptation measures

125. In its NC6, Germany has provided the required information on the expected impacts of climate change in the country and on adaptation options. Germany's NC6 included an analysis of projected changes of climate variables as well as a broad range of methods and approaches on the assessment of the country's vulnerability to such changes.

126. During the review, Germany provided information on the German Adaptation Strategy. This information was referenced but not elaborated on in the NC6. The German Adaption Strategy identifies 13 spheres of activities and two cross-sectional topics: (a) spatial, regional and physical development planning; and (b) civil protection. The German Adaptation Action Plan, which was adopted in 2011, fleshes out the objectives and options for action laid down in the German Adaptation Strategy and includes specific activities in the following areas: (a) provision of knowledge/information on and facilitation of climate services; (b) framework and incentive-setting by the German Government; (c) adaptation in "the Federal Government's own house"; and (d) international responsibility.

127. In addition, during the review, Germany provided additional information that indicated progress in the implementation of the German Adaptation Strategy since the NC5. This information covered: (a) impact and response indicators for all spheres of activity in the German Adaptation Strategy (the draft report of this work is expected to be published in spring 2015); (b) the scope of work for Germany's vulnerability assessment, which is being carried out by a vulnerability network made up of a number of scientific and public authorities; and (c) preliminary results from Germany's vulnerability assessment. The ERT encourages Germany to include the latest information on the progress made in implementing the German Adaptation Strategy in its next NC.

128. With regard to cooperation with non-Annex I Parties in preparing for adaptation, Germany's NC6 makes a reference to the German Adaptation Action Plan, which mentions two key programmes: (1) a strategic approach, led by the Federal Ministry for Economic Cooperation and Development (BMZ), for guidance on cooperation with developing countries in the field of adaptation; and (2) a World Meteorological Organization strategy for supporting adaptation measures. The ERT encourages Germany to include information on its cooperation with developing countries in preparing for adaptation in its next NC. Table 8 summarizes the information on vulnerability and adaptation to climate change presented in the NC6.

Table 8
Summary of information on vulnerability and adaptation to climate change

Vulnerable area	*Examples comments adaptation measures reported*
Agriculture and food security	*Vulnerability*: lower harvests due to excessively high temperatures and insufficient precipitation. An increase in climate variability can cause severe fluctuations in yields and failed harvests. *Adaptation*: growing the right varieties and new types of crops, as well as switching to cultivation methods that will protect soil and conserve water. Cultivation methods that protect the soil are progressively becoming more popular, primarily in eastern Germany.
Biodiversity and natural ecosystems	*Vulnerability*: annual rhythms, the propagation and reproductive success of species, the composition and structure of communities, and changes in intra-species diversity. Adverse effects are expected in the case of mountain and coastal species and species with specialized requirements, such as aquatic and wetland habitats or localized special sites. *Adaptation*: German Adaptation Strategy, National Strategy on Biological Diversity, biotope networks and renaturing projects, landscape planning as a management approach, agro-biodiversity and regional climate models.
Coastal zones	*Vulnerability*: changes in the frequency of temperature index days, i.e. ice, frost and summer days/tropical nights. Summers are expected to become drier and storm surges may occur. There is great uncertainty about the probable scale of changes in sea level and the storm climate. *Adaptation*: European Union (EU) flood risk management directive (directive 2007/60/EC); National Strategy for Integrated Coastal Zone Management (2006); Joint Task for the Improvement of Agricultural Structures and Coastal Protection (GAK).
Drought	*Vulnerability*: in agriculture and forestry, for example, prolonged periods of drought may threaten harvests and reduce or destroy the economic livelihood of the rural (and indirectly the urban) population. *Adaptation*: AdaptAlp project, GAK.

Vulnerable area	*Examples comments adaptation measures reported*
Fisheries	*Vulnerability*: ocean warming, changes in the system of currents, ocean acidification and breeding patterns. *Adaptation*: EU marine strategy framework directive (directive 2008/56/EC), which is the environmental pillar of the EU Integrated Maritime Policy, German Adaptation Strategy.
Forests	*Vulnerability*: with increasing heat in summer and the increasing duration of dry phases, the forests are suffering from heat and drought stress. There is also increased danger of forest fires, pests and a marked increase in the risk of natural disasters (intense rainfall, debris flow, floods and rock falls). *Adaptation*: GAK. Measures also exist for the prevention and management of calamities.
Human health	*Vulnerability*: changes in climate and weather conditions could lead to increases in infectious and non-infectious diseases (such as cardiovascular disease and allergy disorders) and injuries owing to extreme weather events. Rising temperatures can affect the safety or storage life of food. *Adaptation*: German Infection Protection Act and the Environment and Health Action Programme.
Infrastructure and economy	*Vulnerability*: extreme weather situations involving snow, ice, fog, hail, heat-waves, storms, intense rainfall, floods, low river levels or heavy seas can interfere with road, rail, water and air transport. A direct risk from storms exists for tall power supply structures and signals. Extreme weather events such as storms, droughts and periods of high and low water may impair the operation of installations and equipment for energy conversion, transport and supply. Climate changes can also have an impact on the yield and reliability of systems for the generation of renewable energies. *Adaptation*: the Climate Change on Waterways and Navigation in Germany programme that is led by the Federal Ministry of Transport, Building and Urban Development. Energy supply companies in Germany are already taking precautions with regard to their own responsibility against extreme weather events. The Commission on Process Safety (section 51a of the Federal Immission Control Act).
Water resources	*Vulnerability*: long-term trends such as groundwater levels, changes in discharge patterns in the Alps (e.g. Rhine and Danube) and water quality, and the increased frequency of extreme events (e.g. floods, storm surges and droughts). Existing regional differences in the availability of water are expected to intensify. Challenges involved in the complex interactions of water uses are to increase, and this creates a wide range of adaptation needs for water resources management, flood control and coastal protection. *Adaptation*: EU water framework directive (directive 2000/60/EC), flood risk management directive (directive 2007/60/EC), draft German Environmental Code (UGB II, section on water management).

F. Research and systematic observation

129. Germany has provided information on its actions relating to research and systematic observation, and addressed both domestic and international activities, including the World Climate Programme, the International Geosphere–Biosphere Programme, the Global Climate Observing System (GCOS), and the IPCC. The NC6 also reflects action taken to

support related capacity-building in developing countries. Furthermore, Germany has provided a summary of information on GCOS activities.

130. Additional information provided by Germany during the review indicated that Germany has approximately 800 publicly funded research institutions and about 68 research networks, and that gross domestic expenditure on research and development was 2.89 per cent of GDP in 2011.

131. On climate change-related research, the relevant national political strategies are the Energy Concept and the transformation of the energy system, the National Sustainability Strategy, the Mobility and Fuels Strategy, the German Adaptation Strategy and the High-Tech Strategy for Climate Protection. A key national research strategy is the Framework Programme Research for Sustainable Development, which is led by the Federal Ministry of Education and Research (BMBF). The 6th Energy Research Programme for an environmentally sound, reliable and affordable energy supply is an important step towards implementing the Energy Concept from 28 September 2010, which underpins the German Government's intention to make the transition to the renewable energy age. The general goals of the Internationalisation Strategy are to take international responsibility in tackling global challenges; and strengthening cooperation with developing countries in the fields of education, research and development.

132. Germany's NC6 describes in detail the partnerships that Germany has with numerous developing countries. These include the funding programme Research for the Sustainable Development of Megacities of Tomorrow, which is a partnership being implemented through nine bilateral transdisciplinary teams of researchers working in nine cities covering the areas of water management, transport/mobility, energy supply/energy management, construction/housing/urban planning, waste management, urban agriculture and resource conservation. The Regional Science Service Centres for Climate Change and Adapted Land-Use in Africa is a partnership led by BMBF and is a joint initiative with African countries in response to the challenges of global change. In 2010, BMBF launched the programme called International Partnerships for Sustainable Technologies and Services for Climate Protection and the Environment, which aims to use exemplary projects that implement environmental technologies and services to mitigate climate change.

133. Germany is involved in a number of domestic and international research and systematic observation activities, including on the atmosphere, marine and polar regions, the hydrological cycle, land surface and land use, all of which are underpinned by extensive national, regional and global modelling and prediction networks. Germany's GCOS coordinator is located within the German National Meteorological Service. Detailed information on GCOS activities is contained in the Fourth Report of the Government of the Federal Republic of Germany on Systematic Climate Observations in Germany. This report was submitted together with the NC6 and describes areas where Germany makes significant contributions to space research and monitoring, international data and product centres, and the monitoring of atmospheric, oceanic and terrestrial essential climate variables.

G. Education, training and public awareness

134. In the NC6, Germany has provided information on its actions relating to education, training and public awareness at both the domestic and international level. The ERT notes that Germany has improved the manner in which information on education, training and public awareness is packaged in the NC6 in comparison to the NC5. This section in the NC6 provides a clear separation between Germany's actions regarding education, training and public awareness in schools, vocational education, professional education and the

public. In addition, Germany has provided new information reflecting progress made in training, education and public awareness projects that were reported in the NC5.

135. Within Germany's dual training system, aspects of environmental protection, sustainability and climate change-related skills are included in all the relevant training regulations. BMWi is officially responsible for issuing these regulations; it does so in consultation with BMBF.

136. Regarding public awareness campaigns and training, Green Day, which has taken place on 12 November each year since 2012, aims to give young people the opportunity to learn about occupational fields and degree courses in climate protection and pique their interest in career opportunities in these areas.

137. A project on climate change in youth workshops and manufacturing colleges aims to make the provision of education on energy matters a firm element of vocational and professional training. Youth workshops support disadvantaged young people in making the transition from school to working life.

138. The information portal StudyGreenEnergy, launched at the end of 2013, is a database with over 300 degree courses that provides guidance on various courses in the field of renewable energy and energy efficiency. The ERT encourages Germany to consider reporting in its next NC on approaches it uses to monitor the impact of its extensive public awareness campaigns.

139. During the review, Germany elaborated on its bilateral, European and multilateral partnerships with more than 40 countries. The International Climate Initiative, which the German Government set up in 2008, supports activities in developing countries and countries with emerging economies and economies in transition. A key element in the International Climate Initiative's public awareness activities is its website.[10]

III. Summary of reviewed supplementary information under the Kyoto Protocol

A. Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

140. Supplementary information provided by Germany under Article 7, paragraph 2, of the Kyoto Protocol in its NC6 is mostly complete and mostly transparent. The supplementary information is located in different sections of the NC6. Table 9 provides an overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol as well as references to the NC6 chapters in which this information is provided.

141. Germany has not reported the following elements of the supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol: a comprehensive description of its domestic and regional legislative arrangements and enforcement and administrative procedures and how this information is made publicly accessible. The technical assessment of the information reported under Article 7, paragraph 2, of the Kyoto Protocol is contained in the relevant sections of this report. The ERT recommends that Germany include these reporting elements in its next NC.

[10] See <http://www.bmu-klimaschutzinitiative.de/international>.

Table 9
Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

Supplementary information	*Reference to the sixth national communication*
National registry	Chapter 2
National system	Chapter 2
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Chapter 1
Policies and measures in accordance with Article 2	Chapter 3
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Chapters 2, 3 and 8
Information under Article 10	Chapter 6
Financial resources	Chapter 6

B. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

142. Germany reported the information requested in section H, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", of the annex to decision 15/CMP.1 as a part of its 2014 annual submission. During the review, Germany elaborated on the information it had provided in NC6 and provided the ERT with the additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

143. During the review, Germany explained that its analyses of the impacts of PaMs in developing country Parties are not done quantitatively but qualitatively. Outputs of its analyses showed that there is no direct impact of their PaMs in developing countries. Rather, its analyses showed a positive effect of PaMs on developing countries in most instances.

144. The ERT considers the reported information to be complete and transparent. The ERT commends Germany for the further information provided during the review. The ERT encourages Germany to continue exploring how it can enhance reporting on its actions to minimize adverse social, environmental and economic impacts on developing countries.

145. The 2014 and previous national inventory reports and the additional information provided during the review week presented several initiatives of Germany aimed at minimizing adverse impacts, including on bioenergy and the Climate Protection Programmes for developing countries. The latter is carried out for by the Deutsche Gesellschaft für Internationale Zusammenarbeit on behalf of the German Government (BMZ). It supports developing countries in the international dialogue on climate in order to strengthen their role in and responsibility for the climate policy process.

IV. Conclusions and recommendations

146. The ERT conducted a technical review of the information reported in the NC6 of Germany according to the UNFCCC reporting guidelines on NCs. The ERT concludes that the NC6 provides a general overview of the national climate policy of Germany, but the report lacks some coherence. The information provided in the NC6 includes most elements

of the supplementary information under Article 7 of the Kyoto Protocol with the exception of information on enforcement and administrative procedures, and on making this information publicly accessible.

147. The ERT notes that constrained human resources may have led to the lack of coherence in the report and to improve the readability of future NCs, the ERT makes the following practical suggestions for Germany:

(a) Improve the packaging of information, including through better organization of information, cross-referencing and the use of graphics to illustrate trends and impacts;

(b) Improve the referencing of information by referring to specific reporting requirements and comparisons by referencing previous NCs and other documents;

(c) Improve the adherence to reporting requirements through raising awareness of the UNFCCC reporting guidelines on NCs among report contributors;

(d) Undertake quality checks to minimize errors and ensure consistency between figures across and between the NC, BR and common tabular format tables.

148. Germany's emissions for 2012 were estimated to be 24.8 per cent below its 1990 level excluding LULUCF and 23.5 per cent below including LULUCF. Emission decreases were driven by the collapse of the East German economy in the early 1990s and the global financial crisis, which led to a fall in emissions in 2009. However, the steady decrease of emissions, which is also reflected in a significant decrease by 45.7 per cent of emissions per GDP over the period 1990–2012, shows a decoupling of GHG emissions and GDP, which has been induced in part by mitigation measures, such as the increasing share of renewable energy within the energy mix, efforts to increase energy efficiency and a reduction in waste disposal.

149. Based on the comparison of the target and the average annual emissions for the first commitment period (2008–2012), Germany is in a position to meet its Kyoto Protocol target for the first commitment period (21.0 per cent reduction) by domestic efforts.

150. The NC6 contains some information on how Germany's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action, although it did not elaborate on supplementarity as such. Germany is not planning to make use of the Kyoto Protocol mechanisms to meet its Kyoto Protocol target for the first commitment period.

151. In the NC6, Germany presents GHG projections for the period 2010–2030. One scenario is included: a 'with measures' scenario. The projected reductions in GHG emissions under the 'with measures' scenario in relation to 1990 is 32.8 per cent in 2020 and 42.6 per cent in 2030.

152. Germany participates in and contributes to the EU target of a 20.0 per cent emissions reduction by 2020 under the Convention and its Kyoto Protocol second commitment period. At the time of the review, national targets for EU member States under the Convention and the Kyoto Protocol second commitment period had not yet been decided. Sectors covered under the EU ETS have an EU-wide emissions cap and can purchase emission credits to offset GHG emissions. For the non-ETS sectors (excluding LULUCF under the Kyoto Protocol), Germany has a target of a 14.0 per cent emission reduction by 2020 compared with the 2005 level. Considering the implemented and adopted PaMs, Germany expects to meet this target.

153. Regarding the ambitious domestic target of a 40.0 per cent emission reduction by 2020 compared with 1990, the projected emission reduction of 32.9 per cent is insufficient to achieve this target. To meet the 40.0 per cent reduction target, Germany is preparing the Climate Action Programme 2020, which will outline additional measures.

154. Germany reported on its PaMs adopted, implemented and planned in achieving its emission reduction commitments. The main framework for PaMs relating to energy and climate change in Germany is the Energy Concept, for which the first annual monitoring report was published in December 2012. Germany has committed to publish a more extensive report every three years, starting at the end of 2014. Germany's Energy Concept sets ambitious targets to increase renewables and energy efficiency all while phasing out nuclear power. Germany has shut down seven nuclear power plants and plans to cease generating nuclear power from 2022.

155. Germany has also reported on PaMs in the non-energy sector, including: (a) PaMs to reduce leakage of F-gases and replace equipment with those that use gases with lower GWPs; (b) reduce emissions from agriculture linked to the EU nitrates directive, and utilize EU CAP payments for land-use change; (c) ambitious targets to reduce waste in landfills and recover biogas for energy and biomass for compost from organic waste; and (d) funding to support afforestation and promote biodiversity.

156. Germany's package of PaMs reflects a mix of legislated and regulatory measures, fiscal and market based instruments, funding programmes and voluntary measures. Key legislation supporting Germany's climate change goals includes the Renewable Energy Sources Act, the Energy Saving Act and the Energy Industry Act and Grid Expansion Acceleration Act.

157. Germany plays a considerable role in assisting developing countries and countries with economies in transition by providing financial aid through its well-developed multilateral and bilateral climate finance programmes. The majority of Germany's contribution to bilateral and multilateral funding is for GHG mitigation efforts. Yet the share of adaptation relevant funding has increased during the reporting period. With regard to the most recent financial contributions (fast-start finance) to enhance the implementation of the Convention by developing countries, Germany had committed itself to provide EUR 1.26 billion for 2010-2012 and slightly exceeded the commitment, reaching EUR 1.289 billion of fast-start finance for 2010-2012, with a balanced allocation between mitigation, adaptation and REDD-plus. Germany remains the third-largest contributor to the GEF and the largest donor to the LDCF and SCCF. Germany is contributing substantially through activities related to financial support, technology transfer and capacity-building.

158. Germany is currently implementing the German Adaptation Strategy, which sets the framework for Germany's national adaptation process. Extensive progress is being made in particular with regard to the assessment of vulnerability to climate change.

159. Germany, in its NC6, has provided extensive information on its actions relating to research and systematic observation, addressing both domestic and international activities.

160. Germany's NC6 contains considerable information on education, training and public awareness. It builds on the information provided in the NC5 and also describes further actions and activities on education, training and public awareness.

161. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol is provided by Germany in its 2013 and 2014 annual submissions.

162. In the course of the review, the ERT formulated several recommendations relating to the completeness and transparency of Germany's reporting under the Convention and its Kyoto Protocol. The key recommendations[11] are that Germany:

[11] The recommendations are given in full in the relevant sections of this report.

(a) Improve the completeness of the reporting by including, in the next NC, the following information:

(i) An estimate of the total effects of implemented PaMs, including all quantified PaMs, presented by gas;

(ii) Presentation of the projections (aggregated and by gas);

(iii) A description of its domestic and regional legislative arrangements and enforcement and administrative procedures, specifically of the enforcement procedures Germany has in place to meet its Kyoto Protocol commitments, and how Germany makes this information publicly available;

(iv) Activities related to technology transfer, including success and failure stories using table 6 from the UNFCCC reporting guidelines on NCs (Description of selected projects or programmes that promoted practicable steps to facilitate and/or finance the transfer of, or access to, environmentally sound technologies);

(b) Improve the transparency of reporting by including in the next NC the following information:

(i) A more comprehensive description of non-energy PaMs, especially in the agriculture sector;

(ii) Concrete information on whether it plans to use mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol;

(c) Follow more closely the structure outline contained in the annex to the UNFCCC reporting guidelines on NCs, in particular when reporting on PaMs, financial resources and technology transfer.

V. Questions of implementation

163. During the review, the ERT assessed the NC6, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol and reviewed information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, with regard to timeliness, completeness, transparency and adherence to the reporting guidelines on NCs. No question of implementation was raised by the ERT during the review.

Annex

Documents and information used during the review

A. Reference documents

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention. Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention. Part I: UNFCCC reporting guidelines on annual inventories". FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention". Annex to decision 23/CP.19. Available at <http://unfccc.int/resource/docs/2013/cop19/eng/10a02.pdf#page=20>.

FCCC/SBI/2011/INF.1. Compilation and synthesis of fifth national communications. Executive summary. Note by the secretariat. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01.pdf>.

FCCC/SBI/2011/INF.1/Add.1. Compilation and synthesis of fifth national communications. Note by the secretariat. Addendum. Policies, measures, and past and projected future greenhouse gas emission trends of Parties included in Annex I to the Convention. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a01.pdf>.

FCCC/SBI/2011/INF.1/Add.2. Compilation and synthesis of fifth national communications. Note by the secretariat. Addendum. Financial resources, technology transfer, vulnerability, adaptation and other issues relating to the implementation of the Convention by Parties included in Annex I to the Convention. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a02.pdf>.

FCCC/SBI/2011/INF.2. Compilation and synthesis of supplementary information incorporated in fifth national communications submitted in accordance with Article 7, paragraph 2, of the Kyoto Protocol. Note by the secretariat. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf02.pdf>.

FCCC/ARR/2013/DEU. Report of the individual review of the annual submission of Germany submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/deu.pdf>.

FCCC/IRR/2007/DEU. Report of the review of the initial report of Germany. Available at <http://unfccc.int/resource/docs/2007/irr/deu.pdf>.

FCCC/IDR.5/DEU. Report of the in-depth review of the fifth national communication of Germany. Available at <http://unfccc.int/resource/docs/2011/idr/deu05.pdf>.

Sixth national communication of Germany. Available at <http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/national_communication_eng_bf.pdf>.

2013 GHG inventory submission of Germany. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/deu-2013-nir-15may.zip>.

2014 GHG inventory submission of Germany. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/deu-2014-nir-15apr.zip>.

European Environment Agency. 2013. *Trends and projections in Europe 2013*. Available at <www.eea.europa.eu/publications/trends-and-projections-2013/full-report-ghg-trends-and-1>.

European Environment Agency. 2014. *Trends and projections in Europe 2014*. Available at <http://www.eea.europa.eu/publications/trends-and-projections-in-europe-2014/at_download/file>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Mareike Welke (German Ministry for the Environment, Nature Conservation, Building and Nuclear Safety), including additional material on updated policies and measures, greenhouse gas projections, the national registry and recent climate policy developments in Germany. The following documents[1] were also provided by Germany:

Bürger V, Kranzl L, Müller A and Steinbach J. 2013. *Modelling Policy Impacts with Invert EE-Lab* (internal information to support the preparation of the second policy group meetings).

Fraunhofer Institute for Systems and Innovation Research (ISI), Institute for Resource Efficiency and Energy Strategies and TEP Energy. 2013. *FORECAST Model Description (programme version 4.0)*. Zürich.

German Government. 2010. *Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply*. Berlin: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Available at: <http://www.germany.info/contentblob/3043402/Daten/3903429/BMU/BMWi_Energy_Concept_DD.pdf>.

German Government. 2014. *Climate Protection on Figures: Facts, Trends and Incentives for German Climate Policy*. Berlin: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety .Available at: <http://www.bmub.bund.de/N51045-1/>.

Germany. 2013. *Projektionsbericht 2013 gemäß Entscheidung 280/2004 EG* (Report on projections 2013 following decision 280/2004/EC). Available at <http://cdr.eionet.europa.eu/de/eu/ghgpro/envuucoda/>.

Harthan R and Koch Dr. M "Power Sector Modelling at Oeko-Institut", presentation made in Berlin, 12 December 2012.

[1] Reproduced as received from the Party.